PRELIMINARY TECHNOLOGY ASSESSMENT

Building-Integrated Photovoltaics for Windows

What is this Technology?

Building-integrated photovoltaics (BIPV) are power-generating components designed to replace conventional materials, such as glazing units, within the building envelope. They can be applied as retrofits or incorporated into the roofs, skylights, and facades of new buildings. The BIPV technology GPG will evaluate is a laminate applied to window glazing. The technology leverages proven, durable, standard crystalline-silicon-based photovoltaic cells. During the automated manufacturing process, the PV cells are cut into strips, reconnected into PV-strings, and arranged within the laminate. The distance between the strips determines the balance between power generation and visible light transmission (Tvis)—tightly packed strips generate more power but transmit less light. By incorporating BIPV with IGUs, solar heat gain, insulation, and Tvis can be specified to meet predetermined specifications. While the technology is proven, its application in BIPV is pre-commercial. GPG is partnering with DOE's FLEXLAB at Lawrence Berkeley National Laboratory to test the viability of BIPV for windows in a controlled test-bed environment before installing it in a real-world environment.

Why is GSA Interested?

Replacing conventional building materials with BIPV has the potential to improve the energy efficiency of the building envelope while simultaneously turning large surface areas into electricity generating assets, making zero- energy buildings a closer reality. BIPV also offers an alternative to on-site power generation without bulky rooftop solar systems.

ENERGY EFFICIENCY The manufacturer estimates a 15-30% reduction in solar heat gain and energy cost savings of up to 20%.

COST-EFFECTIVENESS The manufacturer estimates a typical 3-year payback with a 10% solar-investment tax credit.

OPERATIONS & MAINTENANCE BIPV installation leverages existing trade and construction techniques. It has no unique maintenance requirements.

DEPLOYMENT POTENTIAL The technology is intended for south-, west-, and east-facing windows with unobstructed access to direct sunlight. It will be most cost-effective for new construction and major renovations where the added cost of the PV component is an increment over the cost of a code-compliant window. This technology will generate maximum power in western and southwestern states where sunlight is plentiful, but promises to be economically attractive nationwide.

The Green Proving Ground program has commissioned Lawrence Berkeley National Laboratory to perform measurement and verification of Building-Integrated Photovoltaics in a controlled test-bed environment.

GPG
Green Proving Ground Program

The Green Proving Ground program leverages GSA's real estate portfolio to test innovative building technologies. The program helps GSA meet its sustainability goals by providing actionable data that informs investment decisions targeted at energy-use reduction.